Reg. No.



MANIPAL INSTITUTE OF TECHNOLOGY

(A constituent unit of MAHE, Manipal)

VII SEMESTER B.TECH (MECHANICAL ENGG.) END SEMESTER MAKEUP EXAMINATIONS, DECEMBER 2018

SUBJECT: PRODUCTION PLANNING & CONTROL [MME 4103]

REVISED CREDIT SYSTEM

Time: 3 Hours

Instructions to Candidates:

- Answer ALL the questions.
- Missing data if any may be suitably assumed.
- 1A. What are the stages of Production Planning Control?

02

MAX. MARKS: 50

1B. University Press publishes textbooks for the academic market. The relevant cost and printing equipment-related capacity information are given below: Regular production cost = Rs. 20 per book

Regular production maximum capacity = 10 000 books per quarter

Overtime production cost = Rs. 30 per book

Overtime production maximum capacity = 5000 books per quarter

Subcontracting cost = Rs. 35 per book

Beginning inventory = 0

Holding cost = Rs. 2 per book

a) Fill all blank spaces in the following table so that it represents an aggregate production plan using a pure level approach with average demand (Production at constant rate). What is the total cost of the initial plan?

0	2
	.5
~	•

03

Quarter	Demand	Total Production	Inventory	Regular Production	Overtime Production	Subcontract
1	5000			-		
2	10000		114	1		
3	30000					
4	25000	0.004-8-400	3	Setting to the part of the		

b) Fill all blank spaces in the following table so that it represents an aggregate production plan using a pure chase approach (vary production to match demand). For this question, we will ignore workforce-related costs since the cost information is not provided. What is the total cost of the plan? Compared to the level approach in part a), which approach seems better? Justify your answer briefly.

Quarter	Demand	Total Production	Inventory	Regular Production	Overtime Production	Subcontract
1	5000		IC PUBL	The second		
2	10000					
3	30000				-	
4	25000					

MME 4103

Page 1 of 3

- 1C. Describe the Production Planning problems in Job Shop Production and Continuous Production (Mass Production) systems.
- 2A. In simple exponential smoothing forecasting, what is the significance of exponential smoothing constant α? The sales of a product during the last four years were 860, 880, 870 and 890 units. The forecast for the fourth year was 876 units. If the forecast for the fifth year. using simple exponential smoothing, is equal to the forecast using a three period moving average, find the value of the exponential smoothing constant α . 031/2
- 2B. Compute the Mean Absolute deviation (MAD), the running sum of forecast errors (RSFE) and hence obtain the Tracking Signal for a six month period for the following set of data where the period number, demand forecast (set at constant 1000) and the actual demand occurrences are given below:

MONTH	1	2	3	4	5	6
DEMAND FORECAST	1000	1000	1000	1000	1000	1000
ACTUAL DEMAND	950	1070	1100	960	1090	1050

- 2C. What are seasonal indices? Under what circumstances can they be used? Explain the procedure for calculating the seasonal index.
- 3A. Shown below are the due dates (number of days until due) and process time remaining (number of days) for five jobs A, B, C, D and E have arrived at one time to be processed on a single machine.

JOB	A	В	С	D	E
Due Date (Days)	08	03	07	09	06
Process Time (Days)	07	04	05	02	06
0 11 11 1	· · · · · · · · · · · · · · · · · · ·		·		() = 1.

Sequence the jobs by priority rules: (i) Shortest Processing Time (SPT) (ii) Earliest Due Date (EDD). Compare the effectiveness of the SPT and EDD rules in terms of (i) Average completion time (ii) Average job lateness (iii) Average number of jobs in the work center.

3B. There are six jobs which must go through two machines A and B in the order A – B. Processing time (in hours) is given here:

JOB	A	В	С	D	E	F
MACHINE - A	08	10	. 11	12	16	20
MACHINE - B	07	15	10	14	13	09

Determine the optimum sequence and the idle time for machine A and machine B? 031/2

- 3C. The maximum level of inventory of an item is 100 and it is achieved with infinite replenishment rate. The inventory becomes zero over one and half month due to consumption at a uniform rate. This cycle continues throughout the year. Ordering cost is Rs.100 per order and inventory carrying cost is Rs.10 per item per month. Find the annual cost (in Rs.) of the plan, neglecting material cost.
- The following data is related to Paroma Ltd. 4Δ

The following data is i	elateu it	Faluli	a Liu				
ITEM NO.	11	12	13	14	15	16	17
UNIT COST	05	10	14	07	06	15	20
ANNUAL DEMAND	47000	1500	200	700	4700	1100	17000
Categorize the items a	according	g to AB	C analy	/sis.			

4B. Annual demand for window frames is 10000. Each frame cost Rs. 200 and ordering cost is Rs. 300 per order. Inventory holding cost is Rs. 40 per frame per

MME 4103

Page 2 of 3

04

021/2

031/2

02

031/2

03

year. The supplier is willing of offer 2% discount if the order quantity is 1000 or more, and 4% if order quantity is 2000 or more. If the total cost is to be minimized, the retailer should order how many window frames?

4C. A contractor undertakes to supply diesel engines to a track manufacturer at the rate of 7,500 per annum. He finds that the cost of holding a completed engine in stock is Rs. 16 per month. Production of engines is in batches and each time a new batch is started, there are set up costs of Rs. 10,000. How frequently should the batches be started and what will be the minimum average inventory cost and production time if production rate is 12,000 engines per annum.

-	-
F	Λ
J	А.

Task	Immediate predecessor	Task time(minutes)
А	None	0.9
В	А	0.4
С	В	0.6
D	С	0.2
E	С	0.3
F	D, E	0.4
G	F	0.7
Н	G	1.1

Using the above information in the table:

a. Draw a precedence diagram.

b. Assuming that 55 minutes per hour are productive, compute the cycle time needed to obtain 50 units per hour as the output.

c. Determine the minimum number of workstations required and assign the tasks to various stations using the longest-task-time heuristic.

5B. End product P is assembled from three major assemblies A, B and C. Subassembly A consists of two units of D, two units of E and one unit of F. Subassembly B consists of one unit of G and three units of H. Subassembly C consists of two units of J and one unit of F. Subassembly Component D consists of two units of J and one unit of K.

(i) Construct a product structure tree for end product P with product level codes that would be assigned to the end product and components for BOM planning purpose.

(ii) Calculate the quantities of the subassembly components required to produce 200 units of P.

5C. An automobile air conditioner manufacturer currently manufactures its KB-300 line at three different locations, Plant A, Plant B, Plant C respectively. The locations of the existing plants are: Plant A (150, 75), Plant B (100, 300) and Plant C (275, 380). Recently, management has decided to build all compressors, a major component in a separate dedicated facility Plant D. Using the centre of gravity method and the information given below determine the best location for Plant D. Assume a linear relationship between volume shipped and shipping costs. Quantity of compressor required by each plant is given below:

Plant	Compressor required per year
А	6000
В	8200
С	7000

MME 4103

Page 3 of 3

031/2

03

03¹/₂

031/2